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New Species of Ustilagineae and Uredineae.

By J. B. Ellis and B. M. Everhart.

Ustilago Washingtoniana E. & E.

On leaves of some grass, State of Washington, spring of 1892 (E. R. Lake).

Sori linear, 1 mm.–2 cm. long, covered at first by the lead-colored epidermis, soon exposed and then mass of spores nearly black. Spores globose, 8–10 μ diam., olive-brown, minutely echinulate and filled with numerous small nuclei. The sori are sunk in the substance of the leaf, which is finally eaten away and perforated by them.

Closely resembles *Ustilago longissima* (Sow.), but the spores are larger and minutely echinulate.

Entyloma arnicalis E. & E.

On leaves of *Arnica cordifolia*, Latah county, Idaho, July, 1893 (C. V. Piper, No. 122).

Spots amphigenous, deep rusty brown above, paler below, subangular, 2–4 mm. diam., with a pale yellow shaded border. Sori subepidermal. Spores spherical, hyaline at first, then pale brown, 10–12 μ diam., with a smooth epispore 1½–2 μ thick. Conidia (*Ramularia arnicalis* E. & E. Proc. Acad. Nat. Sci. Phil. 1891, 85) hypophyllous subcylindrical 15–20×2½–3 μ, 2–3-nucleate, the upper end mostly a little curved, borne on subfasciculate hyphae 12–20×2½–3 μ.

Uromyces pulchellus E. & E.

On leaves and petioles of *Silene?* sp. Lake Chelan, Wash. Aug. 1892 (Lake & Hall).

III. Sori scattered or circinate, mostly hypophyllous, small (½ mm.), naked, nearly black. Teleutospores obovate or elliptical, becoming chestnut-brown, 22–28×18–22 μ, epispore smooth, rather thick, moderately thickened at the rounded apex. Pedicels 35–50 μ long, stout, hyaline. There was no indication of any *Aecidium* on the specimen examined.

UROMYCES CARICINA E. & E.

On leaves or culms of *Carex scoparia*, Alcove, N. Y., July, 1893 (C. L. Shear, No. 81). II. & III.

Sori scattered, oblong, ½–1 mm. long by about ⅓ mm. wide, covered by yellowish epidermis, not confluent. Uredospores sparingly mixed with the teleutospores in the same sori, ovate or elliptical, pale, tuberculo-echinulate, 20–22×14–16 μ. Teleutospores obovate, pale below, rounded at the apex, or often with a distinct hyaline papilla, epispore smooth, strongly thickened and dark colored at the apex, 19–23+14–16 μ. Pedicels yellowish, about as long as the spores.

Uromyces Caricis Pk. has naked cinnamon-colored sori and larger spores.

PUCCINIA TRIFOLIATA E. & E.

On *Tiarella trifoliata* Seattle, Wash. June 1892 (Prof. C.V. Piper).

I. Aecidium on the slightly swollen stems and petioles. Erumpent, closed at first, soon open and cup-shaped, about ½ mm. diam., thin, margin toothed. Spores ovate or subglobose, 15–20 μ diam., yellowish, epispore slightly echinulate, amphigenous.

II. Uredo sori small, pale cinnamon color, ⅓–½ mm. diam., naked above. Uredospores obovate or globose, 15–22 μ in the longer diam., rather closely echinulate, hyaline, becoming pale brown.

III. Teleutospores in larger (1 mm.) nearly black naked sori, elliptical, 22–35×15–20 μ, pale chestnut brown, rounded at each end, contents granular, scarcely constricted at the septum, epispore scarcely thickened at the apex, and when examined dry, under a high power, covered with a network of raised lines. Pedicels very short, almost wanting.

Differs from the other related species on *Tiarella* and *Saxifraga* in the presence of *Uredo* and also in other particulars.

PUCCINIA SUBSTERILIS E. & E. [N. A. F. 3141.]

On *Chrysopogon* sp. Fort Collins, Colo., March, 1894 (C. F. Baker, No. 219).

Mostly hypophyllous. Sori (II. and III.) superficial, pulvinate, elliptical, black-brown, ½–1 mm. long, naked. Uredospores

echinulate, globose or elliptical, 20–30×18–22 μ, brownish-black, epispore nearly equally thickened throughout; pedicels slender hyaline, subpersistent, 20–30 μ long. Teleutospores (in the same sori as the uredospores), oblong or clavate, pale, constricted at the septum, 22–30×12–15 μ, epispore smooth, mostly not at all or only slightly thickened at the rounded or subtruncate apex.

The uredospores are abundant and well developed, while the teleutospores are few in number and apparently not well matured.

This is quite distinct from *P. omnivora* E. & E. and from *P. Chrysopogi* Barcl.

PUCCINIA OMNIVORA E. & E. [N. A. F. 3049.]

On *Chrysopogon nutans*, leaves and stems, Newfield, N. J., autumn 1893.

II. and III. Uredospore sori minute, narrow, 1–2 mm. long, at first covered, then rupturing the epidermis and discharging the yellow, globose or subelliptical, 18–22 μ, subechinulate spores.

III. Sori amphigenous, but mostly hypophyllous, oblong or linear, 1 mm.–1 cm. long, ⅓ mm. wide, at first covered, but soon bare and margined by the ruptured epidermis, nearly black. Teleutospores elliptical to oblong, 22–40×12–16 μ, scarcely constricted, mostly rounded at each end, but those in the center of the sori narrower and paler, and gradually attenuated into the stout, 50–70×4–6 μ, yellowish-hyaline pedicel, upper cell darker, and in the shorter, elliptical spores mostly rounded at the apex without any distinct papilla, the narrower, paler spores with a distinct yellowish-hyaline obtusely conical papilla, epispore smooth, distinctly thickened at the apex.

Has the habit of *P. graminis*, but the spores are decidedly smaller, both the uredo and teleutospores.

PUCCINIA MAGNOECIA E. & E.

On leaves of *Aster pulchellus*, Mts. above Lake Chelan, Wash., Aug. 1892 (Lake & Hall).

III. Teleutospores slender-clavate, 40–50x14–16 μ, pale-brown, almost hyaline below, epispore smooth, much thickened at the apex and darker, slightly constricted, crowded in broad (2–3 mm.), bullate, nearly black, hypophyllous sori, which are partly covered by the epidermis. The upper surface of the leaf is marked by reddish-brown spots corresponding to the sori on the opposite side. The spores are mostly regularly rounded at the apex, but sometimes obtusely pointed or even truncate. Pedicels about as long as the spores.

Differs from *P. Asteris* in its large, dark sori.

PUCCINIA PHILIBERTIAE E. & E.

(*P. Gonolobi* Rav. var. *Philibertiae* Pk. in M. E. Jones' list of western plants, not described.)

On leaves and follicles of *Philbertia viridiflora?* Britton and Rusby, near Las Cruces, New Mexico, Oct., 1892 (E. O. Wooton, No. 43).

Amphigenous, but mostly hypophyllous. Sori hemispherical, dark chestnut brown, ½–¾ mm. diam., superficial, mostly circinate around a compact central group of several confluent or connate sori; on the follicles the sori are densely crowded, covering the entire follicle, which is thus dwarfed and rendered abortive. Teleutospores elliptical or obovate, 20–30×15–20 μ, scarcely constricted, rounded and obtuse at the apex, lower cell a little paler and often narrowed at the base, epispore smooth, scarcely thickened at the apex, contents of the cells granular. Pedicels slender, subhyaline, 55–65 μ long. Mesospores abundant, mostly smaller.

PUCCINIA ZIZIAE E. & E.

On leaves of *Zizia cordata*, Pullman, Wash., September, 1893 (Prof. C. V. Piper, No. 164).

III. Amphigenous but mostly epiphyllous. Sori small (¼–½ mm.), not confluent, nearly black, soon naked; seated on small (1–2 mm.), whitish, irregularly shaped spots, which are often confluent. Teleutospores obovate, elliptical or oblong-elliptical, 22–30×15–20 μ, only slightly constricted; epispore smooth, rather thin or only slightly thickened at the rounded apex. Pedicels hyaline, about as long as the spores.

Differs from *P. bullata*, in its darker sori, smaller spores and, as far as yet known, in the absence of any *Aecidium*.

PUCCINIA NIGROVELATA Ell. & Tracy.

On *Cyperus strigosus*, Mississippi (Tracy). II & III.

Uredospores in short (1–2 mm.), oblong-elliptical sori, surrounded by the erect margin of the ruptured epidermis, ovate or elliptical, pale yellowish, aculeolate, 15–24 (mostly 15–20)×12–15 μ, mass of spores cinnamon colored. Teleutospores in flat sori, 1–3 mm. long, ¾–1 mm. broad, closely covered by the epidermis, which appears black by translucence, clavate-oblong, 35–55×14–18 μ, broadly constricted, lower cell pale and narrowed to the pedicel, upper cell broader and darker, epispore smooth, thickened at the apex, which is either rounded or obtusely pointed, with or without a hyaline papilla. Pedicels mostly shorter than the spores. The teleutospore sori at length open by a longitudinal crack along the middle.

PUCCINIA CLADII Ell. & Tracy.

On *Cladium effusum*, Ocean Springs, Miss., Aug., 1889 (Prof. S. M. Tracy). II. & III.

On the culms and peduncles of the cyme. Sori small, elliptical, subconfluent, so as often to envelope and cover the peduncles for 2 or more cm. in extent; at first covered, then bordered by the ruptured yellowish epidermis. Uredospores ovate or elliptical, 22–25×20 μ, or subglobose, 18–20 μ, at first hyaline, then deep red-brown (or ferruginous-yellow while lying in the sori) aculeate. Teleutospores in similar but much darker colored sori, clavate or oblong, 45–60×18–22 μ, constricted, deep brown, lower cell narrower and paler, epispore smooth or slightly granular-roughened above, strongly thickened at the obtusely rounded apex, or with an oblique papilla, or sometimes subtruncate-flattened. Pedicels shorter than the spores, hyaline or slightly colored, stout. The uredospores are also pedicellate.

PUCCINIA GRANULISPORA Ell. & Galloway.

On stems and leaves of *Allium cernuum?* Montana, 1890 (Prof. F. D. Kelsey).

II. and III. Sori linear, ¼–1 cm. long, shorter on the leaves, ½ mm. wide, at first covered, then exposed by a longitudinal cleft in the epidermis, but only slightly prominent. Uredospores subglobose, pale, faintly echinulate, 20–30×15–20 μ. Teleutospores oblong, clavate or obovate, 45–60×20–25 μ, smooth, with granular contents, slightly constricted, upper cell subglobose or elliptical, darker, moderately thickened at the rounded or obtusely pointed or often truncate apex, lower cell paler, cuneate. Pedicels shorter than the spores, colored. Mesospores not abundant, shorter, obovate, 20–23 μ long.

Differs from *P. Porri* in its linear sori and larger teleutospores.

AECIDIUM CYLINDRICUM E. & E.

On leaves of *Houstonia angustifolia*, Osborne, Kansas, June, 1894 (C. L. Shear).

Spermogonia? Aecidia hypophyllous, subseriate along each side of the midrib, white, cylindrical, about 1 mm. high, margin minutely subfimbriate-dentate. Spores orange-red, angular-globose, smooth, 18–22 μ. The upper side of the leaves is more or less blackened and papillate from the projecting bases of the aecidia.

Differs from *Aecidium houstoniatum* Schw. in its elongated, cylindrical aecidia.

Contributions to American Bryology—IX.

By Elizabeth G. Britton.

(Plates 229–231.)

I. The Systematic Position of Physcomitrella patens.

It must have occurred to every student of the mosses of the United States that the foot-note* at the bottom of page 39 of Lesquereux and James' Manual indicated a curious state of classification, and this feeling is increased when a study of the specimens and literature convinces him that the facts which have been taken for fixing arbitrary lines are still open to question and have been disputed by several well-known bryologists. The questions in doubt are these:—Has *Physcomitrella patens* a dehiscent, differentiated, lid? and is it distinct generically from *Aphanorhegma?* We propose to answer both these questions in the affirmative.

The history with regard to European specimens is best shown by the following citations:—

Physcomitrella patens (Hedw.) Br. & Sch.

Phascum patens Hedw. Descr. 1: 28. *pl. 10* (1787).

Physcomitrella patens Br. & Sch. Bryol. Eu. 1: *pl. 3* (1849).

Aphanorhegma patens Lindb. in Ofv. K. Vet. Akad. Forh. 580 (1864).

Limpricht (Rab. Kryptfl. 4: 174. 1886) and Braithwaite (Brit. Mosses, 2: 127. 1890) maintain *Physcomitrella* as a genus and state that the capsule is indehiscent, or the lid not differentiated; hence the former places it among the cleistocarpous mosses, and the latter, following Lindberg and Hampe, classes it with the Funariaceae. The latter is undoubtedly its most natural alliance. Lindberg claims to have seen the lid. Schimper in the last edition of the Synopsis Muscorum (1876) says that he has not seen it.

"De operculi vestigi a Clarissimo Lindberg laudato adhuc nil vidi."

*"*Aphanorhegma serratum*, Sulliv., differs from this spec es (*Physcomitrella patens*) only in the regular dehiscence of the capsule, which divides in the middle and is therefore considered as operculate or stegocarpous, though no discoloration nor any kind of modification of the texture is observable on the line of disruption. But for this regular dehiscence *Aphanorhegma* should be described here merely as a variety of *Physcomitrella patens*. It is therefore a remarkable connecting link between the Ephemereae : nd the Physcomitrieae, which resemble each other also in the areolation of the leaves."

We have taken pains to see all the available American material of *Physcomitrella patens* in the Sullivant herbarium as well as in that of the Department of Agriculture and others. In Drummond's Southern Mosses, No. 5, collected near St. Louis, the specimens are still in perfect condition for examination. Many of the capsules have not split, but several of those which have show with a low magnification a perfectly circular rim. Under a high magnification, after boiling and mounting, the walls are torn irregularly, but a distinct median line of separation, where the cells are elongated with longer transverse walls, was seen, even on the irregularly torn capsules.

No. 30, Sull. & Lesq. Musci Bor. Am. Ed. 2 (1865), collected in Ohio, also are in fine condition. Few of the capsules have split, but after mounting in glycerine jelly, three capsules did split regularly in half, and although we have seen no differentiation of the cells along the suture, yet from its regularity, we suspect it is there. It is almost impossible to determine this after the dehiscence of the capsules, as the walls are so thin, the cells so tender, that in boiling to get rid of the spores, the walls are injured beyond possibility of examination. The stomata are basal, and seem partly immersed.

In Sullivant's own herbarium we found specimens from Columbus, Ohio, collected in 1852, several capsules of which had split regularly in half as seen by reflected light with a low power.

Quite recently we have received from Fort Snelling, Minnesota, specimens collected by Grace E. Sheldon on October 1, 1894, which show a differentiation of the cells around the middle of the capsule. Fig. 8 of our plate was drawn from these specimens. These capsules are very fresh and young, the cells of the walls still contain chlorophyll, and are more distinct than any we have seen. Starting from the stomatose base, the longest diameter of the cells is vertical, they measure .013×.027 mm., gradually the cells become larger, still keeping their longest diameter vertical, and twice the length of the shortest, measuring .027×.054. At the line of dehiscence the cells are transversely elongated, three times longer than wide, and measures .016×by .054 mm.

Taking the above observations only for what they are worth, it seems to me that we may at least give the question the benefit

of a doubt, and would advise any one having access to fresh material of this rare and interesting species, and who is familiar with modern laboratory methods, to do some careful bleaching and staining, and try to prove conclusively whether *P. patens* belongs with the Cleistocarpous mosses or not.

The stomata as figured by our artist do not agree with fig. 59 of Limpricht's Laubmoose (Rab. Kryptfl. **4**: 158), but in all our specimens they seem to be more or less immersed, and it is only in deep focussing that the outlines appear distinct.

There seems to be some uncertainty as to the position of the antheridia in *Physcomitrella patens*. Schimper in the Bryologia (*t. 3*) figures them in basal buds, but in the Synopsis Muscorum (Ed. 2, 1876) he corrects himself, saying they are axillary to the upper leaves. As in *Aphanorhegma* they have also globose-tipped paraphyses.

Limpricht says they may be either naked and pseudo-lateral under the perichaetium or on a branch, seldom at the base of the vaginule; the paraphyses may be thread-like or globose-tipped. We have not been able to verify any of these statements from fresh American material.

The genus *Aphanorhegma* was founded by Sullivant in 1848 (Gray's Man. Ed. i., 647. 1848). *Physcomitrella* was not published till 1849 (Br. & Sch. Bryol. Eu. fasc. 42). In his search after earlier names, Lindberg seems to have allowed dates to have more weight than facts. From the accompanying plates and descriptions, it seems to me that we cannot consider *Physcomitrella patens* and *Aphanorhegma serrata* as congeneric, much less is one "merely a variety of the other."

Description of Plate 229, Physcomitrella patens (Hedw.) Br. & Sch.

1. Plants, natural size.

2–3. Two enlarged, showing the immersed capsules.

4. Outlines of leaves.

5. Half of the base of one leaf enlarged, showing cells.

6. Apex enlarged.

7. Capsule enlarged, showing the stomatose base, and irregular line of dehiscence, the parenchymatic walls and large apical cells.

8. Cells of the walls still further enlarged, showing the transverse elongation of those in the middle of the capsule, the hexagonal ones above.

9. Apex of capsule enlarged.

10. Spore.
11. Same much enlarged, snowing the spines.
12. Stoma, enlarged, showing the overlapping cells.
13. Calyptra.

Description of Plate 230, Aphanorhegma serrata Sull.

1. Plants, natural size.
2. Same, enlarged.
3. Outlines of leaves.
4. Cells at base of one side of leaf.
5. Cells of the apex.
6. Perichaetial leaves removed, showing the antheridia mixed with the archegonia in the upper axils.
6–7, Distinct antheridial clusters.
8. One of the globose-tipped paraphyses.
9. Leaves removed, showing the subapical innovations of the stems and the nearly sessile capsules.
10. Single capsule enlarged, showing median dehiscence and flaring rim.
11. Spores, one enlarged, showing spines.
12. Collenchyma cells below the mouth showing the thickened walls.
13. Cells of lid.
14. Two stomata enlarged.
15. Calyptra.

2. On a Hybrid growing with Aphanorhegma serrata Sull.

(Plate 231.)

These specimens were distributed in Drummond's mosses of the Southern States (1841) as No. 20, labelled as follows:

Schistidium serratum, nov. sp.
Foliis obovatis acuminatis sub apicum serratis, capsula hemisphaerica.
Near St. Louis, growing with *Phascum serratum*.

In the set belonging to the Columbia College Herbarium, there is an unmistakable hybrid between *Aphanorhegma serrata* and an unknown *Physcomitrium*, probably *P. turbinatum*, though, of course, the hybrid is not characteristic, as the archegonial plant was *Aphanorhegma*, and the antheridial plant was not distributed and could not be as easily determined.

Aphanorhegma serrata ♀ × *Physcomitrium turbinatum* ♂ (?).

Schistidium serratum Hook. & Wilson in Drummond's Southern Mosses no. 20 (1841).

Plants 3–5 mm. high, gregarious, bushy; stems branching and rooting at base of the innovations; leaves crowded, 2–3 mm. long, lanceolate or oblanceolate, from an oblong base, margins serrate

above, marginal cells inflated with oblique walls; vein ending below the apex, or excurrent into the subulate tip. Sporophyte of two kinds. The normal, immersed ones of *A. serrata*, splitting in half when mature, becoming broadly flaring, with several rows, 8–10, of dark collenchymatic cells bordering the mouth and forming the whole of the lid; the spores rough, .024–.027 mm. The hybrid sporophytes exserted; seta 2–6 mm.; capsule turbinate, not splitting in the middle, but with a smaller apical lid, which is bordered by one row of denser cells and is composed of parenchymatic cells, as well as the walls of the capsule; mouth bordered by two rows of dense oblong cells, and a persistent well-differentiated annulus; spores .016–.018 mm., immature.

Type locality near St. Louis, Missouri; type specimen No. 20, Drummond's Southern Mosses, in the Herbarium of Columbia College.

I wrote to Kew for information concerning Hooker and Wilson's specimens, and Mr. Wright says they also have a mixture in Drummond's No. 20, but he does not mention any exserted capsules. "Some of the plants have broad leaves, similar to those of *Phascum patens*, as is shown by Sullivant in Mem. Acad. n. ser 3:60. *t. 11* (1848) and in Sullivant's Icones, *t. 57*. Others have longer, narrower leaves, and an almost sessile capsule, with a regular operculum. On another specimen (13b, Mississippi, Drummond) Wilson has written 'In this tuft is also found *Phascum patens*.'"

Drummond's specimens were supposed to be the ones on which Sullivant founded his genus *Aphanorhegma*, but it is clear, on consulting his herbarium, that his set of Drummond's mosses could not have supplied the figures which are given in the Memoirs of the American Academy (3: 60. *t. 2.* 1848), for he had only a few old ragged plants of No. 20 with deoperculate capsules. He distributed in the Musci Alleghanienses No. 198 (1846) specimens from Virginia and Ohio, as *Schistidium serratum*, and in the original description of *Aphanorhegma* in Gray's Manual he makes no mention of Drummond's specimens, and gives the distribution "from New England to Ohio." These must be the types of the genus, and the ones figured in the Icones Musc. *t. 57*.

Description of Plate 231.

All the plants taken from Drummond's Southern Mosses, No. 20.

1. A plant of *Aphanorhegma serrata* bearing three normal capsules, old, immersed and empty, with a flaring mouth, broader than the depth of the capsule; the spores measure .024–.027 mm., and are rough and brown.

1a. Hybrid sporophyte, with exserted seta 6 mm. long, the capsule not splitting in the middle, but with a smaller lid, the mouth bordered by two rows of cells and an annulus, the spores imperfect, .016–.018 mm.

2. A plant of *Aphanorhegma serrata* with one old, flaring, immersed capsule, spores .024–.027 mm.; to the left, on a separate branch, two younger capsules, immersed and immature.

3. The lower plant is *Aphanorhegma serrata* with a single immersed flaring capsule, the spores .027–.029 mm.

3a. Another immersed, flaring capsule with mature spores .027 mm. in diameter.

3b. Four other branches, all bearing exserted capsules, less flaring than the other two and bordered by only two rows of cells with a distinct annulus, the spores imperfect and massed together in the sporesac.

3d. was found in place on 3c., but in boiling it fell off. It will be seen that the cells of the lid are quite different from that of Fig. 6.

4. A simple, unbranched plant of *Aphanorhegma serrata*, showing the shape just after dehiscence.

5. Same, enlarged, showing the 8 rows of thick, collenchymatic cells bordering the mouth.

6. Lid of same, enlarged; also composed of collenchyma.

7. Spores spinosely roughened, .024–.027 mm. from Fig. 4.

8. A normal plant of *Aphanorhegma serrata* with two capsules, one old and flaring, the spores .024–.027 mm., the other just splitting in half, with the calyptra still on.

3. On a European Hybrid of Physcomitrella patens.

There has been recorded in Europe another hybrid which makes a curious parallel between *Aphanorhegma* and *Physcomitrella*, and it seems to have puzzled European bryologists, for they do not agree in the interpretation of the facts. The synonymy is as follows:

Physcomitrella Hampei Limpr. (Rab. Kryptfl. 4: 175. 1886).

Physcomitrella patens × *Physcomitrium sphaericum*.

Physcomitrella patens var. *pedicellata* Br. & Sch. Br. Eu. *t. 3y* (1849).

Ephemerum patens var. *anomalum* Hampe in sched.

Aphanorhegma patens var. *anomalum* Hpe.; Lindb. in Ofv. K. Vet. Akad. Förh. 580 (1864).

Physcomitrella patens var. *anomala* Hpe.; Milde in Bryol. Sil. 191 (1869).

Milde says of it that the capsules are long-stalked with unmistakable indications of a lid. These specimens were collected at Blankenburg in the Harz Mountains by Hampe.

Schimper, Hampe, Lindberg, Braithwaite, Husnot, Sullivant and Lesquereux and James (our American authorities probably cited the European) all state that *P. patens* may have the capsules either immersed or exserted, and Boulay states that it is very variable and that the different forms may be found growing "pell-mell" in the same locality.

Limpricht, in a foot note to his description of *P. Hampei*, says that Lindberg claims to have seen this form in the axils of the leaves of *P. patens* but that he has never seen it.

We have a slight addition to make from our own observations, for in the Jæger Herbarium we find authentic specimens of Hampe's labelled: "Ephemerum patens var. anomalum. Seta exserta. p. Blankenburg. Ex. herbar. E. Hampe, 1865." These specimens show what Limpricht says he has not seen, two kinds of capsules on the same plant.

One plant which we have mounted has two capsules; the lower one small, immersed, with thin walls and characteristic large apical cells of *Physcomitrella patens*. The other is exserted on a thick seta 2 mm. long, with regular distinct cells in the walls of the capsules and a differentiated lid. The exserted capsules are almost all either young or aborted, so that no spores have been seen, but one old capsule has been found with the lid off, showing the mouth bordered with an orange-colored rim of cells and a distinct annulus. The immersed capsules are on the lower part of the plants, as in our hybrid; most of the capsules are older and have perfected their spores with measure .024–.027 mm. and are rough.

Japanese Characeae—II.

By T. F. Allen.

11. *Chara coronata* Ziz., collected in Province Ise, differs in no essential point from the forms of Nos. 2 and 3.

12. *Nitella Japonica* Allen, from a new locality in Province Ise, namely Yamagami; distributed with No. 14, under the exsiccatae number 9.

13. NITELLA PULCHELLA sp. nov.

Nitella polyarthrodactyla, monoica, gloeocarpa.

Stems about 460 in diamater. Verticels consist of eight or nine leaves (with an occasional simple, undivided leaf, but not heterophyllous.) Leaves about 150 in diam., thrice divided, primary segment much longer, (2680); first node bears 6–7 secondary segments, 68 diam., 600 long; second node bears 5 tertiary segments, 34 in diam., 175 to 200 long; occasionally one of these divisions is undivided like a simple terminal with three cells; the third node bears four to six (usually four) two-celled terminals, 25 diam., 170 to 240 long. The terminals are two (rarely 3) celled, the cells about equal in length; the terminal cell is not mucroniform, but terminates, rather abruptly, in a sharp point (some collections more elongated and slender); other specimens, terminals very short, forma brachyteles. The fertile verticils are somewhat compact and borne upon pedicels arising from the stem within the primary verticils; the entire fertile verticil becomes a globular, gelatinous mass. The leaves of the fertile verticil are usually *twice* divided, the antheridia borne on the second node are about 225 in diam., and decidedly stipitate, the stipes 200 long and 54 in diam. The oogonia are borne on both nodes of the leaf, single; usually on the terminal node, sessile, the coronula minute.

The oospore, dark reddish, is 250 long, 200 broad, with 7–8 prominent ridges, the surface is strongly reticulated, the reticulae 5–12 in diam.

The relationship of this beautiful species is not clear, in some features it may be related to *N. trichotoma* A. Br., but it is clearly separated from it as well as from the subspecies *Zeyheri* and *Lechleri*.

It may be considered remotely similar to *N. gelatinosa* A. Br., of Australia, where species of the polyarthrodactylae-gloeocarpae section most abound, but this species remains quite unique and individual.

No. 14, *Nitella Japonica*, additional collections, more mature, from Yamagami, Province Ise, distributed as exsiccatae No. 9.

No. 15, NITELLA SUBGLOMERATA JAPONICA *var. nov.*

Verticels consist of a large number of leaves, often 12 to 16, apparently irregularly in a double series, some longer, some shorter, but all twice divided; the first node bears three oogonia and three secondary divisions, the second node also bears three oogonia and three terminals; rarely one of the secondary divisions does not form a node, but remains as a simple one-celled ter-

minal; the terminals of the second node, usually three in number, are one-celled and acuminate above the middle, terminating in a sharp point which is solid.

The oogonia are aggregated, three together, at each node of the leaf, not closely sessile, with a rather large and persistent coronula, the lower cells of which appear to be spreading, as in some sub-species of the polyglochin group, in all from 350 to 400 long. The oospore is marked with 6 striae, 204 long, 180 to 190 broad. The membrane of the spore is strongly reticulated, the reticulae averaging 5 μ in diameter. This Japanese form differs mainly in the somewhat smaller spores, which are much more strongly reticulated; the antheridia also are smaller, 200 in diam. This species was collected in Mikawa, Seishin pond, and distributed as No. 15 of my Japanese exsiccatae.

No. 16. NITELLA SUBLUCENS sp. nov.

Nitella diarthrodactyla, homoeophylla, monoica macrodactyla, subflabellata, gymnocarpa. Fertile verticils contracted into dense terminal or axillary heads, long overtopped by the sterile leaves; verticils very dissimilar. The long sterile leaves are surmounted by a crown of about four minute two-celled leaflets. Fertile leaves twice- rarely thrice-divided, terminal segments usually four, short, two-celled, the lower of the two cells inflated, theterminal cell a sharp mucro, oogonia clustered at the base of the fertile verticils and at the first node of the leaves; oospore, 285 long and broad, globular, six or seven striate. The present specimens are too immature to determine the character of the membrane of the spore. Antheridia about 200 in diameter.

This species is closely allied to *N. translucens* (Pers.) Ag; from which it differs by its smaller size, and especially the much smaller oospore (and its locality).

This species was collected in Sagami, Kodsu, and distributed as No. 16 of my Japanese exsiccatae.

17. *Chara gymnopitys* A. Br. var. "*alpha*" A. Br.

This form, though not exactly corresponding to *gymnopitys genuina* A. Br., seems to be on the border between that and var. (*beta*) *duriuscula* A. Br., both from Australia; and as A. Braun has left var. "Alpha" blank, it may well be occupied by this variety. The stems are about 306 in diam., with small, conical, broad-pointed spines; leaves about 8, stipules 16, the cortex cells double, alternately large and small, often with additional, partially

developed cells, so that sections show about 20 cortex tubes; bracts at the leaf-nodes equally developed all around, slender, long, acuminate-pointed, about 60 in diam. The oogonia seem to be distinctly stipitate, the oospores average 560 long by 365 to 390 broad, with 8 (10–11) striae. The coronula is short, broad and square-shaped. Antheridia are rather rarely found, 293 in diam.; when present, conjoined.

This species was collected in Mikawa, Tennu pond, and distributed as No. 10 of my Japanese exsiccatae.

No. 18, same species and variety as the last, collected in Tokio, Shinbashi pond, and distributed as No. 11 of my exsiccatae Japonicae. Nos. 19, 20 and 21, *Nitella pulchella* Allen, collected respectively in Chikubushima pond, Mikawa Tennu pond, and Tokio Shinbashi pond, and distributed as Nos. 13 and 14 in my exsiccatae Japonicae.

As a matter of record it may be well to add that the following list of Exsiccatae Japonicae has been distributed as far as specimens would allow; of *N. sublucens* Allen only fourteen specimens could be sent out.

CHARACEAE JAPONICAE EXSICCATAE.

DISTRIBUTAE A T. F. ALLEN.

I

1 Chara fragilis Desv.
2 Nitella coronata Ziz.
3 Nitella coronata Ziz.
4 Nitella Japonica Allen.
5 Nitella mucronata A. Br. var. tenuior A. Br.
6 Nitella Japonica Allen.
7 Nitella orientalis Allen.
8 Nitella pulchella Allen.
9 Nitella Japonica Allen.
10 Chara gymnopitys A. Br. var. "alpha" A, Br.
11 Chara gymnopitys A. Br. var "alpha" A. Br.
12 Nitella paucicostata Allen.
13 Nitella pulchella Allen.
14 Nitella pulchella Allen.
15 Nitella subglomerata A. Br. var. Japonica Allen.
16 Nitella sublucens Allen.
17 Nitella oligospira A. Br.

Tradescantia Virginica var. villosa Watson.

There are doubts whether this is a variety of *Tradescantia Virginica* L. or should have specific rank. Forms are found which apparently connect the extremes and make it difficult to draw the

line of separation. As the two are found growing in company at Forest Hill, in the southern border of Chicago, and where they are clearly distinct, I have had a good chance to observe them for several years in their native condition. I first met with the variety in 1878, and have watched it more or less since. At that time it was not easy to refer this low or dwarf plant, broad leaved, green and early maturing, to *Tradescantia Virginica* as described in the books, usually a much taller, smooth, narrow-leaved and glaucous plant, which kept on flowering throughout the summer. Still more than their different look, it was their early flowering and disappearance which particularly called attention to them. Rafinesque, in the species which he made out and gives in his "New Flora and Botany of North America," calls some "vernal" and others "estival."* This holds good between the two found here. Notes made in 1878 give the time of gathering as May 30th. Those of 1880 state that hundreds were examined on June 11th, and none were in flower, all having gone to seed. *Tradescantia Virginica* was then fairly in its season of bloom, only a few having passed that stage. May 12, 1894, a few of the low kind were found in flower; on the 21st they were in great abundance. At the latter date but three of the other form were found in flower after a long search. On June 19th half a dozen flowers of the low form were discovered after a search of an hour or more in spots where the plants were most numerous. The taller form was then in full bloom everywhere. The stems of the low form were mostly dead or dying, some lying flat on the ground. Their season was virtually over. A number of plants of *T. Virginica* were seen in flower August 16th. The last one observed was on August 29th, except a single plant on October 2d, probably a case of flowering the second time. The broad leaved form behaves like a vernal plant, early in the season maturing its buds for the coming year, its aerial parts then disappearing, a process mostly completed by the last of June. Some of the other form will have passed their floral season then, but others keep up the succession so that they are common or even abundant in July. I have as yet detected the low kind in but one locality, while the other grows in profusion wherever the conditions are suitable.

*l. c. p. 84 ff.

The two do not intergrade here, something which might be expected where they are so intimately associated in some places that both forms can be taken up with the same handful of earth, with their roots intermingling. Hence there is little difficulty in distinguishing each, their involucral leaves in most cases being at once decisive. Sometimes the typical form becomes low, and occasionally pilose, generally in poor soil or in the sand region, but it preserves the main characteristics of the plant, and rarely deceives one.

As found here the following descriptions will give their points of similarity or difference:

TRADESCANTIA VIRGINICA L.

Plants glaucous, stems single or clustered, 1–5 feet high, generally 1½–3 feet, simple, or frequently branched, smooth. Leaves channeled, narrow, linear to linear-lanceolate, scarcely ciliate except at base, the sheaths and base of the leaves on the lower part of the stem sometimes pilose. Involucral leaves mostly shorter than the stem-leaves, generally much shorter, often abruptly contracted from an ovate base, which usually sheaths the umbel when in bud. Umbel simple, many flowered. Peduncles and calyx smooth. Flowers blue, varying to purplish blue. Roots coarsely fibrous, variable in color, whitish to yellow.

Abundant in open woods, fields and borders of woods.

May–August.

T. VIRGINICA L. var. VILLOSA Watson.

Plants green, rarely glaucous, stems single or oftener clustered, 2–15 in. high, mostly 5–10 in., simple or occasionally branched, sometimes flexuose, smooth or hairy. Leaves flattish, prominently nerved, broadly linear to linear lanceolate, ciliolate, hairy or roughish with short hairs, especially the upper, the lower becoming smooth or smoothish. Involucral leaves usually longer and broader than the stem leaves, ½–1¼ in. wide, gradually tapering from the base, which scarcely or not at all sheaths the simple, many flowered umbel. Peduncles and calyx villous. Flowers commonly purplish-blue, varying to blue. Roots coarsely fibrous, yellow, often deep yellow.

Woods or borders of woods, frequently in rather dense woods.

May–June.*

* Torrey (Flora of the Northern and Middle Sections of the United States, 1824, 335), describes *T. Virginica* as if he had this form in hand. He says the stem is "about a foot high," the involucrum "large, 2-leaved," "flowers pubescent." May is given as the time of flowering. He adds, "My specimens are from Lake Michgan."

CHICAGO, ILL. E. J. HILL.

Some new Hybrid Oaks from the Southern States.

By John K. Small.

(Plates 232–235.)

The following is a record of some observations on several interesting forms of *Quercus* growing in North Carolina and Georgia, together with a striking hybrid existing in two well-marked forms, found in Lake county, Florida, by Mr. Geo. V. Nash, during his collecting trip of last season.

Quercus Phellos × Q. digitata.

A large and stout tree with rough scaly bark, reaching a height of from twenty to thirty-five meters, and having a trunk diameter ranging from six to nine decimeters. Trunk forking several feet from the ground, the divisions thence branching, the branches rather erect and the branchlets straggling; leaves oblong, obovate or oblanceolate, 5–20 cm. long, 2–10 cm. broad, mostly entire and undulate or somewhat crisped, or more or less two-lobed or three-lobed near the apex, acute or obtuse at the apex, acute, obtuse or subcordate at the base, the upper surface dark-green and glabrous, the lower brown and more or less tomentose with reddish brown, stellate hairs, especially about the midrib and principal nerves; mature fruit not seen. (Plate 232.)

Hills west of the Falls of the Yadkin River, North Carolina.

In 1892 I found a small grove of peculiar looking oak trees in a very shallow depression in the foot-hills of the Falls Mountains, just west of the Falls of the Yadkin River, in Stanley county, North Carolina. Specimens were collected, but there was not time for a thorough investigation of the case. The specimens suggested a form of *Q. Rudkini* (*Q. Phellos* × *Q. nigra*), and some were distributed under that name. Each succeeding year I have observed the trees and their surroundings, and am now confident that the parents are not those of *Q. Rudkini*, but *Q. Phellos* and *Q. digitata*, the two prevailing species of the immediate region. *Q. nigra*, one of the undoubted parents of *Q. Rudkini*, was not observed within several miles. The form of *Q. digitata*, which is apparently one of the parents of the hybrid under consideration, is not that with long, falcate leaf-lobes, but one common through the pine woods in the middle country of the Southern States. Its leaf is not as deeply lobed and has a more cuneate

outline. As in the case of the following hybrid, this one produces on the same branches leaves almost identical in shape with those of the parents. Many, however, are intermediate, in various degrees resembling one or the other of the parent forms. The texture is about intermediate, and the pubescence on the lower surface less than in *Q. digitata* and much more than exists in true *Q. Phellos*.

The cup and acorn, although not mature, each exhibit characters which suggest *Q. digitata* rather than *Q. nigra*. Most of the trees noticed had the peculiar habit of forking about three feet from the ground into two erect secondary trunks. This character, together with the striking irregularity in the shape of the foliage, makes the trees quite conspicuous among their associates.

QUERCUS GEORGIANA × Q. NIGRA.

A small tree of a dark-green color and a somewhat straggling mode of branching, ranging from three to ten meters in height and having a trunk diameter varying from ten to twenty-five centimeters clothed with a dark, smooth, glabrous bark, which becomes rough on the trunk. The leaves are mostly obovate in outline, sometimes oblong, 4–20 cm. long, 2.5–15 cm. broad, 3–5-lobed, dark green and shining above, brown and dull beneath, glabrous on both surfaces, except a small tuft of stellate hairs in the axils of the nerves on the lower side, obtuse or acute, equilateral or inequilateral at the base, the sinuses either shallow or deep, sometimes penetrating almost to the midrib; the lobes rounded or square-oblong and slightly lobed at the ends, all ending in a slender apiculation; fruit 12–15 mm. long, 13–16 mm. broad, short-stalked, peduncle 4–6 mm. long; cup saucer-shaped or slightly turbinate, reddish, the scales triangular, the acorn depressed-globose, pubescent, sometimes sparingly striped, ending in a short, abrupt apiculation. (Plate 233.)

Northern slope of Stone Mountain, DeKalb county, Georgia.

On the northern slope of Stone Mountain, at an altitude of about 1300 feet, there is a grove of stunted trees of various species of oaks, *Quercus Georgiana* and *Q. nigra* predominating. I had been in the grove a number of times, but noticed nothing peculiar until January, 1894, when my attention was called to some odd shaped leaves on the ground and anomalous acorns on the branches overhead. This material suggested a hybrid form. Last September I visited the same spot to secure fresh foliage from the trees and make some further observations.

Q. Georgiana and *Q. nigra* were the only species in the immediate vicinity, and the trees in question appear intermediate between the two. In place of the graceful port of the preceding species there was a certain amount of the rugged habit of the latter. The texture of the foliage is intermediate, and leaf forms suggesting both species occur on the same branches. Mature fruit also has traces of the characters of that of both the parents. The accompanying plate gives some of the extreme leaf forms.

QUERCUS CATESBAEI × Q. CINEREA.

Form A, in which Q. cinerea predominates (No. 1586).

A small tree with the habit of *Q. cinerea*, ranging from two and one-half to four meters in height, with a trunk diameter ranging from six to twelve centimeters, branching about one meter from the ground; the branches somewhat spreading, clothed with a smooth, striate bark; the young shoots tomentose with dark-colored trichomes. The leaves are narrowly obovate or oblanceolate, sometimes elliptic or lanceolate, 5–15 cm. long, 2–6 cm. broad, entire, undulate and more or less crisped or partially 3–7-lobed, either on one side or on both, acute or acuminate at both ends, short-petioled or sessile, the upper surface light and very bright green, the lower surface lighter but rather dull and more or less tomentose, the midrib and nerves white but not prominent above, prominent beneath, the lobes short-apiculate; cup hemispheric-turbinate, 13–14 mm. broad, 10 mm. high, nearly sessile. (Plate 234.)

Growing in dry, sandy soil, in high pine lands on the road between Umatilla and Lake Ella (about two miles from the latter place) in Lake county, Florida.

Form B, in which Q. Catesbaei predominates (No. 1577).

A small tree, with much the habit of *Q. Catesbaei*, reaching a height of two or three meters and having a trunk diameter of six to nine centimeters, the trunk branching from within 3 or 5 dm. of the ground, the branches more spreading than in the former. Branchlets conspicuously marked with white lenticels, the young twigs white-tomentose; leaves mostly oblong in outline, sometimes obovate, 6–15 cm. long, 3–10 cm. broad, usually 5–7-lobed, sometimes 2–3-lobed or nearly entire, more or less irregular and inequilateral, acute or obtuse at the base, short-petioled, the lobes narrow, acute and apiculate by a long, sharp bristle, somewhat tomentose beneath, the nerves prominent and conspicuous on both surfaces. Flowers and fruit not seen. (Plate 235.)

Grows in dry, sandy soil in high pine lands, on the road between Umatilla and Lake Ella (about three-fourths of a mile from the latter place) in Lake county, Florida.

Family Nomenclature.

By Dr. V. Havard.

Much credit is due Mr. Barnhart for taking up and elaborating this important problem which now forces itself upon the attention of botanists for a satisfactory solution. Uniformity and stability in family nomenclature are as desirable and necessary as in genera and species, and therefore such nomenclature must be built upon secure foundations and placed within the dominion of law.

The advantages of a common ending for all family names are obvious and generally recognized, and the ending most habitually used is *aceae*. There seems to be no valid reason why it should not be applied under all circumstances; it does no violence to logic, grammar or analogy, and there should be no difficulty in sacrificing custom and tradition to law and uniformity.

To this extent I agree with Mr. Barnhart, and I also recognize the wisdom of not going behind the Species Plantarum of 1753.

To his rule that the root of the family name shall always be that of the accepted name of a recognized genus belonging to that family, I am inclined to demur, and would instead offer the following propositions:

1. The name of each natural family shall be the oldest name properly published, changing its termination into *aceae* if otherwise ended.

2. The name shall be properly published, if in Latin, in the plural number, and accompanied with description clearly based upon one or more genera of said family.

My reasons for dissenting are the following:

1. Priority is the fundamental law of nomenclature and must dominate every other consideration. As the original author of a genus name is allowed entire freedom in his choice (within the limits of correct construction) and receives credit for it, so should the author of a family name.

2. Genera are often separated only by minor and secondary characters, so that their limits are variously estimated, and their names accordingly liable to change with the discovery of new species. Should the family name share the risk of this instability?

3. A family name constructed from a genus name logically implies that said genus is the most important, and that the characters of the family are, in the main, those of this genus, while in reality the genus may be one of the least important and materially differ in its structure from that of other genera, *e. g.*, *Cassiaceae*, which is proposed for *Leguminosaceae* and *Carduaceae* for *Compositaceae*.

4. A family name should, so far as possible, describe a character common to all or a great number of genera in the family, and this seems to have been the praiseworthy aim of several of the distinguished authors to whom we owe the existing nomenclature. The fact that plants of other families may have the same character does not matter; there can be no hard and fast line in classification. For this reason I prefer *Cruciferaceae* to *Brassicaceae*, *Graminaceae* to *Poaceae*, *Coniferaceae* to *Pinaceae*, *Umbelliferaceae* to *Ammiaceae*, etc., even though it is true that umbels are also found in *Araliaceae*, and cruciform flowers in *Capparidaceae*.

5. Our main object being stable uniformity, the rule which will accomplish it with the least disturbance, and preserve the most of the familiar old names should be preferred; if priority is sufficient for the purpose we must reject the more radical and subversive rule of Mr. Barnhart.

Concerning tribal names I presume there is no question that they should invariably be formed from the root of a generic name with the addition of the termination *eae*, as is the usage of our best authors.

Reviews.

The Life and Writings of Rafinesque.—Prepared for the Filson Club and read at its Meeting, Monday, April 2, 1894. By Richard Ellsworth Call.

Filson Club Publications, No. 10. 4to, broad margins, pp. 227. *plates* 5. John P. Morton & Co., Louisville, Ky., 1895.

This splendid volume, creditable both from a literary and from an artistic standpoint, had its inception, so the preface informs us, in an attempt to clear up certain matters connected with the synonymy of the Unionidae, in which family of molluscs

Rafinesque was much interested and in which he did such valuable work.

The Filson Club is an organization having for its object the collection and preservation of original matter connected with the history of the State of Kentucky, hence the publication of this volume as a recognition of "the first resident professor-naturalist within the limits of the State."

Constantine Samuel Rafinesque [Schmaltz]* was born in Galata, near Constantinople, October 22, 1783. His father was French, his mother of German parentage. His early life was spent in France and Italy, and his first essay, written in 1796, was in the form of a journal, describing a tour to Genoa. That he early had the instincts of a naturalist is manifest, for by the time he was fifteen years old he had made collections of plants, fishes, birds and shells, and apparently took but little interest in boyish sports or games, or in association with other youths of his own age.

His first visit to America was in 1802, and here he remained, mostly in the vicinity of Philadelphia, until 1805, when he returned to Italy. There he remained for a period of ten years, during which time he wrote many papers, dealing not only with matters in connection with his surroundings, but also others based upon his observations and experiences while in America. His domestic life was unhappy, however, and doubtless had much to do with his subsequent eccentric manners. In his description of Sicily he says: "She offers * * * a fruitful soil, a delightful climate, excellent productions, perfidious men, deceitful women." In 1815 Rafinesque left Europe forever and set sail for America once more. His arrival was dramatic in the extreme, and doubtless still further heightened his pessimistic ideas. At midnight, November 2d, in a dense fog, the ship ran aground off Fisher's Island, in Long Island Sound, and all the results of his years of toil, mercantile and scientific, were lost.

He finally came to New York and accepted a position as private tutor in a wealthy family. He soon resigned this position,

* He added this, his mother's name, for prudential reasons, on his return to Italy, in order that he might pass for an American and thus avoid certain political complications in which he feared he might become involved.

however, and went to Philadelphia, where he found several good friends and other persons, it seems, who were not, for we hear of him during his stay there as having been bankrupted in a business adventure and defrauded of all his savings by the falseness of a fellow-countryman, to whom he had intrusted his affairs while on his exploring expeditions into what was then called the West, between the Alleghanies and the Mississippi.

Through the influence of one of his Philadelphia friends he secured an appointment to a professorship in the Transylvania University, at Lexington, Kentucky, upon the duties of which position he entered in the fall of 1819. Here he passed seven busy years, during which time he made extensive collections, especially in conchology and botany, wrote and published many papers, attended to his duties at the University and acted as secretary of the Kentucky Institute—the first scientific society formed within the State. One of his great ambitions seems to have been to found or to assist in the foundation of a botanic garden at Lexington, and in 1823 he presented the matter before the State Legislature with such success that the Senate psssed a bill to that effect, but it failed of passage in the Assembly. He then undertook to push the scheme by means of private subscription and the formation of a joint stock company. An act of incorporation was secured, ground was purchased and planting was actually begun, but those upon whom he relied failed to meet their obligations and the attempt was finally abandoned. This embittered and saddened him still further, and he says: " * * * this garden would have been my delight; I had traced the plan of it, with a retreat among the flowers, a greenhouse, museum and library; but I had to forsake it at last and make again my garden of the woods and mountains."

He does not seem to have been in touch with his associates in the University, who took but little interest in his scientific work, and he was doubtless impatient of their criticisms and indifference. Added to this, the students ridiculed him and finally, in June, 1825, he left Lexington and once more made his way to Philadelphia. During the next fifteen years he seems to have lived in a hand-to-mouth manner, practicing medicine in his own way, lecturing at the Franklin Institute and assisting in the estab-

lishing of a savings bank. This latter seems to have met with success, but although it was in existence at the time of his death, his end came to him amidst surroundings of absolute poverty, alone, in a garret in a poor quarter of Philadelphia in 1840.*

His estate consisted entirely of personal property—mostly books, unpublished manuscript and specimens of natural history. The latter had suffered much from his inability to properly care for them, and a large part of his plant collection was sold as waste paper. Eight dray loads comprised the material which he left behind. Some of this is yet preserved in the National Museum; another portion was secured by the University of Pennsylvania through Mr. Isaac Burk, and many of his botanical specimens finally went to the Jardin des Plantes in Paris, and the Philadelphia Academy of Natural Sciences. The final settlement of his estate left it indebted to the administrator in the sum of $14.43.

This, in brief, is the outline of his life as given in the first sixty-nine pages of the volume. Accompanying this are two portraits, one taken from a painting in the collection of the Wisconsin Historical Society, the date of which is uncertain, and another as he appeared in 1810 at the age of twenty-seven, besides which there is a photographic reproduction of one of his letters to DeCandolle, written in 1838.

Following this is a bibliography, arranged in chronologic sequence, enumerating 203 publications, containing 420 titles. It is almost impossible to conceive, in these days of specialization, the wide range of his mental activity of which these give evidence. Botany, Zoölogy, History, Social and Political Economy, Meteorology, Geology, Poetry, Philosophy, Book Reviews, Journals of Travel, Astronomy, Physics, Archaeology, Ethnology, Medicine and other subjects which might be classed as subdivisions of the above, all received his attention.

There is also a chapter devoted to a list of publications in which Rafinesque or his works are mentioned by other authors and an appendix giving a copy of his will, which, in addition to the part describing as to how he wishes his property to be dis-

* According to an article by Thos. Meehan, published in the Philadelphia *Public Ledger* a few years ago, the exact date of which is unknown to me, Rafinesque is said to have died September 18, 1842.

posed, contains the clause, "I wish my body to be burnt rather than buried, as I do not want to contamine the earth by decay, nor be a cause of desease to other men. My ashes, if they can be collected, I wish to be deposited in a Urn, to be kept with my collections."

Apparently his property and certainly his body, was not disposed of in accordance with either the letter or spirit of this document, and his biographer says that he "appears to have been despoiled of his rights in nomenclature while living; he was despoiled of his possessions when dead."

Many of the most interesting details contained in the volume are necessarily omitted in this review, but attention should be called, at least, to the titled headings, "Rafinesque's Name in Nomenclature," where he is commemorated both generically and specifically in botany and zoölogy; "Medals, Diplomas and Other Honors," in which a list of these, conferred upon him by scientific societies at home and abroad is given; "Rafinesque and Evolution;" "Rafinesque's Literary Style;" "Personal Appearance of Rafinesque," etc.

The volume is a model of its kind and is a fitting tribute to the versatile man whose life it memorializes. A. H.

Annual Report of the State Botanist of New York. Charles H. Peck. pp. 48 (From the 47th Report of the New York State Museum of Natural History, Albany, 1894).

Mr. Peck's report for the year 1893 contains a great deal of important and valuable information. It deals with the poisonous toadstools; gives a list of plants added to the State Herbarium, of which 40 species were not before represented, gives notes on species not before reported in any of his communications, there being 14 new Fungi here described in the genera *Psathyrella, Merulius, Stereum, Discosia, Haplosporella, Rhabdospora, Volutella, Cercospora, Peziza, Sphaerella, Clavaria, Leptothyrium, Zygodesmus, Asterula* and *Melogramma*, not all from New York State, however; and under "Remarks and Observations" we find a variety of interesting notes on distribution and on characters of numerous species. Dr. E. C. Howe contributes the description of *Carex Peckii* n. sp., the *C. Emmonsii elliptica* Boott, considering it more nearly related to *C. deflexa* than to *C. Emmonsii.* N. L. B.

Science. This weekly journal of research and discovery, abandoned for some months has been revived under most favorable circumstances and bids fair to give American students a reputable and authoritative medium of rapid and regular publication. It is published under the coöperation of the following Editorial Committee: S. Newcomb, Mathematics; R. S. Woodward, Mechanics; E. C. Pickering, Astronomy; T. C. Mendenhall, Physics; R. H. Thurston, Engineering; Ira Remsen, Chemistry; Joseph Le Conte Geology; W. M. Davis, Physiography; O. C. Marsh, Paleontology; W. K. Brooks, Invertebrate Zoölogy; C. Hart Merriam, Vertebrate Zoölogy; N. L. Britton, Botany; Henry F. Osborn, General Biology; H. P. Bowditch, Physiology; J. S. Billings, Hygiene; J. McKeen Cattell, Psychology; Daniel G. Brinton, J. W. Powell, Anthropology.

Volume I of the new series was begun January 4th, and the seven numbers so far issued are replete with matters of both general and special interest. In these days of extreme specialization and enormous publication, the student tends to confine himself to his chosen sphere of thought, and to know as much as possible about that little sphere, and it would seem in many cases as little as possible about everything else. This tendency has been especially noticable in America, and we may now hope that it will be in large measure corrected by the publication of the journal here noticed.

Manuscript intended for publication and books or papers intended for review should be sent to Professor J. McKeen Cattell, Garrison on Hudson, N. Y. The subscription is fixed at $5.00 a year and should be sent to the Publisher of Science, 41 East 49th St., New York City. We bespeak a cordial support of the enterprise by all American botanists.

Additional Notes on the new Fossil, Daimonelix; its Mode of Occurrence, its gross and minute Structure. E. H. Barbour. Univ. Studies, Univ. Neb. **2**: 1–16. *pl. 1–12.*

This exceedingly interesting contribution to the literature of problematic organisms is the second one on the subject by the author since the original "Notice of new gigantic Fossils," published in Science, **19**: 99–100. *figs. 1–3.* The name has evidently seemed somewhat provincial to the author, so he begins the paper

with the modest excuse that it was adopted in deference to the ranchmen and early settlers who used to know the fossils as "Devil's corkscrews," or "fossil twisters." They have been examined by botanists, geologists and paleontologists and have been considered as plants, animal burrows and "accidents." If they are to be classed with the latter, the author justly says: "Such accidents should be immortalized." Sections examined under the microscope, however, show a structure which is cellular but not vascular, and the author concludes that they represent a new order of aquatic plants, "resembling the red sea weeds more closely than anything else." The illustrations are to be particularly commended, as they represent the location of the fossils in the field at a distance, single specimens close to, microscopic sections and a general view of the collection as it appears in the Museum of the University. A. H.

American Algae. Century I. 1894. Josephine E. Tilden, University of Minnesota, Minneapolis, Minn.

The first distribution of this collection of fresh water algae from the upper Mississippi Valley has made its appearance. All the specimens, including some rare forms, are mounted upon good white card paper in a quarto volume. Labels, including descriptive details, are printed, and the material has evidently been determined and arranged with great care. The work as a whole has only commendable features. It will certainly prove to be of great value to the few herbaria who may be fortunate enough to acquire it, as the edition is limited to twenty-five copies.

A. S.

Through Glade and Mead.—Under this attractive title Mr. Joseph Jackson presents a most pleasing account of the flora of of Worcester county, Mass. This large county, extending across the centre of the State, embraces a very diversified topography. We have the high peak of Mt. Wachusett, with a few plants approaching the sub-alpine character; the rocky cliffs of Westminster, the Purgatory Chasm near Uxbridge, and many fine lakes and ponds, swamps and forests. All this region Mr. Jackson has made peculiarly his own. He takes the reader at once into his confidence, and with charming talk by the way leads

him to his chosen haunts. He knows the poets well, and culls from them their sweetest thoughts. In these days, when so much of our botanical reading has an aggressive and controversial turn, it is refreshing to escape into the fens and forests. Every page in this book is odorous with wild flowers and tuneful with bees and birds.

The volume is amply illustrated by photogravure impressions of actual Worcester county scenes, or of typical wild flowers. Thus the peat-meadow given opposite to page 196 is enough to fill a botanist's soul with envy; and who would not love to wander through the path in the frontispiece?

The series of familiar papers is followed by a catalogue of the plants thus far found in the county, following the last edition of Gray's Manual as to nomenclature. The author, who is eminently fair minded, says: "In the present state of botanical nomenclature, and for the purpose for which this catalogue is intended, I have not thought it wise or necessary to adopt proposed changes not yet generally accepted. The student in such matters can easily adapt himself to changing conditions."

The press-work and general composition of the book are very satisfactory, indeed elegant. W. W. BAILEY.

The Characeae of America. T. F. Allen. Part II. Fascicle 2. Issued December, 1894. Pages 9–17, *plates 8*, species 9, illustrated.

In this fascicle Dr. Allen has described and figured three new species of *Nitella*, *N. Bastini*, *N. dilatata*, and *N. annularis*, and six others are figured and described, *N. capitata*, *N. praelonga*, *N. clavata*, *N. Macounii*, *N. axillaris*, and *N. Morongii*. E. G. B.

List of Pteridophyta and Spermatophyta growing without Cultivation in Northeastern North America. Prepared by a Committee of the Botanical Club, American Association for the Advancement of Science, 8vo, pp. 377. New York, 1893–1894.

This work, originally issued in signatures to members of the committee and such other botanists as expressed a desire for it in that form, is now sent complete, simultaneously with its appearance as Vol. 5, Memoirs of the Torrey Botanical Club.

It had its first definite inception at the Rochester, N. Y., meet-

ing of the American Association for the Advancement of Science in 1892, after the botanists there present had been engaged in an earnest consideration of the principles of plant nomenclature for many years, a subject of discussion in which most American botanists had taken part. An interchange of views between those who were present showed that while there were many differences of opinion in regard to details all were practically agreed as to certain fundamental principles. A committee was, therefore, appointed to prepare a draft of a code, which draft was subsequently presented, discussed, amended and finally adopted. This is now known as "The Rochester Code."

This committee was then continued with power to prepare and print a list of the plants embraced within the area covered by the sixth edition of Gray's Manual of Botany, with the addition of the States of Kansas and Nebraska, and the Canadian Provinces from Manitoba to Newfoundland, in accordance with the principles enunciated in the code. The committee immediately went to work and were able to present the list, in manuscript form, almost complete, at the next meeting of the Club, at Madison, Wis., in 1893.

The committee was then increased by two members, and was authorized to proceed with the printing of the list. Several minor points not determined by the Club, such as capitalization, insertion or omission of commas and use of trinomials, were referred to the committee with power, decided by vote of the members, and the final result is the volume now before us.

That it will meet with the approval of over three-fourths of the working botanists in America, we think there can be no question. The Rochester Code is and has been accepted by such a large majority that it is safe to say no work of magnitude could hope for future success here if based upon different principles. Some of the minor rules adopted in the printing, however, are not yet so generally accepted and may be expected to remain as matters of discussion for some time to come. Commas may be either omitted or retained between the specific or varietal name and the authority; capital letters may or may not be used for specific or varietal names derived from persons or places, etc., and varieties may or may not be written as trinomials. These are minor matters.

What concerns us most nearly is that, unless the citations of date of publication for some of the names should have been wrongly determined, we now have established a permanent basis for our nomenclature, and an amount of condensed study within our grasp, for which all botanists owe the committee a deep debt of gratitude. The labor of this research and of the verifications which were necessary only the members of the committee can appreciate, and we are perfectly willing to forgive, in advance, any errors in this respect which may and probably will be discovered when the list comes to be put into practical use. Each species and variety is given a consecutive number, beginning with 1. *Ophioglossum vulgatum* L., and terminating with 4336. *Ptiloria tenuifolia* (Torr.) Raf., the sequence being in accordance with Engler and Prantl's "Natürliche Pflanzenfamilien." To the list is added an appendix containing references to typographical errors, wrong determinations, changes in synonymy and about fifty additional species.

The committee to whose labors we are indebted consists of N. L. Britton, John M. Coulter, H. H. Rusby, Wm. A. Kellerman, Fredk. V. Coville, L. M. Underwood, Lester F. Ward, Edward L. Greene and Wm. Trelease. A. H.

Proceedings of the Club.

Annual Meeting, Tuesday Evening, January 8, 1895.

The President in the chair and seventeen persons present.

Mr. Leonard Barron and Rev. A. P. Ekman were elected active members.

The following officers were elected for 1895:

President, Hon. Addison Brown; Vice-Presidents, Dr. T. F. Allen, Rev. L. H. Lighthipe; Recording Secretary, Dr. Henry H. Rusby; Corresponding Secretary, John K. Small; Editor, Dr. N. L. Britton; Treasurer, Henry Ogden; Associate Editors, Dr. Emily L. Gregory, Anna Murray Vail, Arthur Hollick, Dr. Byron D. Halsted, A. A. Heller; Curator, Josephine E. Rogers; Librarian, Effie A. Southworth.

Under the reading of communications, a letter was read from Prof. Dr. A. Cogniaux accepting the honorary member-

ship which had been conferred upon him, with warm expressions of appreciation. A communication was then read from Mr. Joseph Crawford announcing the death, on December 6th, of Dr. J. Bernard Brinton. The Secretary remarked briefly on the life and character of Dr. Brinton, and announced that an obituary notice was being prepared which would appear in the BULLETIN. A committee consisting of Dr. Britton and Dr. Rusby was then appointed to draft appropriate resolutions, and to present copies of the same to the family of the deceased.

The death was also announced, by the President, of Prof. E. H. Day, which occurred in Algiers on January 4th. At the same time he remarked upon the high character of the deceased as a scientist, a teacher and a gentleman of refinement. Similar remarks were also made by Mrs. Britton and by Mr. Ogden, and a committee consisting of Mr. Ogden and Mrs. Britton was appointed to draft suitable resolutions and to present the same to the family of the deceased and to the President of the Board of Education of New York City.

The paper of the evening was then presented by Mr. A. A. Heller, entitled "Collecting in Western Texas," illustrated by specimens of the flora.

WEDNESDAY EVENING, JANUARY 30, 1895.

The President in the chair and thirty persons present.

Mrs. Annie M. Smith, of 78 Orange street, Brooklyn, was elected an active member.

On behalf of the Committee appointed to draft resolutions concerning the death of Prof. Day, a report was read by Mr. Ogden and a copy placed on file.

The announced paper of the evening, on "Food Plants of the American Indians," was then read by Dr. Valery Havard, and proved to be one of the most interesting and valuable communications presented to the club in recent years. It will be published in a subsequent issue of the BULLETIN.

Index to recent Literature relating to American Botany.

Ayres, H. B. The Muskeag Spruce. Gard. & For. **7**: 504. *f. 80.* 19 D. 1894.

Barbour, E. H. Additional Notes on the new Fossil, *Daimonelix*, its Mode of Occurrence, its gross and minute Structure. Univ. Studies, Univ. Neb. **2**: 1–16. *pl. 1–12.* 1894.

Cross sections under the microscope show these fossils to have been plants with a structure that was cellular but not vascular.

Barnhart, J. H. Family Nomenclature. Bull. Torr. Bot. Club, **22**: 1–24. 15 Ja. 1895.

Bastin, E. S. Laboratory Exercises in Botany. 8vo. pp. 540. *figs. pl. 87.* Philadelphia. 1895.

Designed for the use of colleges and other schools where botany is taught by laboratory methods.

Bastin, E. S. Some further Observations on the Structure of *Sanguinaria Canadensis*. Am. Journ. Pharm. **67**: 4–9. *f. 1–5.* Ja. 1895.

Bastin, E. S. Structure of *Iris*. Am. Journ. Pharm. **67**: 78–83. *f. 1–5.* Ja. 1895.

Bessey, C. E. The Russian Thistle in Nebraska. Agric. Sci. **8**: 286. Je–S. 1894.

Briquet, J. Decades Mentharum novarum. Bull. Herb. Boiss. **2**: 691–709. D. 1894.

Descriptions of a large number of proposed new varieties in *Mentha*, some of them American.

Briquet, J. Sur un singulier *Hyptis* brésilien. Bull. Herb. Boiss. **2**: 715–719. D. 1894.

Description and discussion of *Hyptis Glaziovii.*

Britten, J. Jane Colden and the Flora of New York. Journ. Bot. **33**: 12. Ja. 1895.

Bush, B. F. Hybrid Oaks in Western Missouri. Gard. & For. **8**: 32. 23 Ja. 1895.

Carleton, M. A. Uredineae Americanae exsiccatae. Bot. Gaz. **20**: 32. 18 Ja. 1895.

Clendenin, I. *Synchytrium* on *Geranium Carolinianum.* Bot. Gaz. **20**: 29–31. *pl. 4.* 18 Ja. 1895.

S. Geranii n. sp.

Coe, C. H. The so-called Florida Sea-Beans. Gard. & For. **7**: 502–504. *f. 79.* 19 D. 1894.

Coulter, J. M. Formulae for Life histories. Bot. Gaz. **20**: 31. 18 Ja. 1895.

Coupin, H. The Thorns of Plants. Pop. Sci. Month. **46**: 498–501 *figs.* F. 1895. (Translated from La Nature.)

Dietel, P. Die Gattung *Ravenelia* (Nachträge). Hedwigia, **33**: 367–371. 20 D. 1894.

Describes *R. Farlowiana*, *R. Indigoferae* Tranzschel and *R. Mexicana* Tranzschel as new species.

Ellis and **Everhart.** Analytical Key to Ellis and Everhart's North American Pyrenomycetes. Pamphlet, pp. 11 [1894].

Ellis, J. B., and **Everhart, B. M.** New Species of Fungi from various Localities. Proc. Acad. Nat. Sci. Phila. 1894: 322–386. 30 N. 1894 (reprint).

Fawcett, W. Two new Orchids from Jamaica. Journ. Bot. **33**: 12. Ja. 1895.

Descriptions of *Epidendrum tridentatum* and *Pleurothallis uncinata.*

Fawcett, W., Editor. Notes on Castleton Gardens. Bull. Bot. Depart. Jamaica, **1**: 161–200. D. 1894.

Fernald, M. L. *Salix balsamifera.* Gard. & For. **8**: 28. 16 Ja. 1895.

Greene, E. L. *Mimulus luteus* and some of its Allies. Journ. Bot. **33**: 4–8. Ja. 1895.

Henderson, L. F. New Plants from Idaho. Bull. Torr. Bot. Club, **22**: 48–50. 15 Ja. 1895.

Describes *Phacelia Idahoensis* and *Claytonia arenicola.*

Hollick, A. Additions to the Local Flora. Proc. Nat. Sci. Assn. Staten Island, **4**: 55. 12 Ja. 1895.

Hooker, J. D. *Acacia spadicigera.* Curt. Bot. Mag. **51**: *pl. 7395.* Ja. 1895.

A native of Central America and Cuba.

Hooker, J. D. *Cyrtopodium virescens.* Curt. Bot. Mag. **51**: *pl. 7396.* Ja. 1895.

A native of Brazil.

Hooker, J. D. *Erycina echinata.* Curt. Bot. Mag. **50**: *pl. 7389.* D. 1894.

Jenman, G. S. *Adiantum Capellis-veneris* Gard. Chron. **16**: 690. 8 D. 1894.
Note on the occurrence of the species in Jamaica.

Jenman, G. S. *Asplenium Harrisi* (*Euasplenium*). Gardn. Chron. **17**: 69. 19 Ja. 1895.
A new species from Blue Mountain Peak, Jamaica.

Jenman, G. S. *Asplenium* (*Diplazium*) *tenebrosiun* n. sp. Gardn. Chron. **16**: 690. 8 D. 1894.
A new species from Jamaica.

Jenman, G. S. *Pteris* (*Litobrochia*) *regia*. Gardn. Chron. **17**: 39. 12 Ja. 1895.
A new species from Jamaica.

Johnson, D. S. The Crystallization of Cellulose. Bot. Gaz. **20**: 16–22. 18 Ja. 1895.

Keffer, C. A. Black Walnut in the West. Gard. & For. **8**: 12. 9 Ja. 1895.

Keffer, C. A. Green Ash in the West. Gard. & For. **8**: 32. 23 Ja. 1895.

Kennedy, G. G. *Buxbaumia aphylla* L. Bull. Torr. Bot. Club, **22**: 50, 51. 15 Ja. 1895.

Knowlton, F. H. Vanilla and its Cultivation. Pop. Sci. News, **29**: 1, 2. *figs*. Portrait. Ja. 1895.

Kurtz, F. Die Flora des Chilcatgebietes in Südöstlichen Alaska. Engler's Bot. Jahrb. **19**: 328–431. 1894.
Ribes laxiflorum var. *inermis* is described as new, and a long list of species given with localities.

Kurtz, F. Die Flora der Tschuktschenhalbinsel. Engler's Bot. Jahrb. **19**: 431–493. 1894.
A long list of species.

Meehan, T. *Aquilegia Canadensis*. Meehan's Month. **5**: 21, 22. *pl. 2*. F. 1895.

Meehan, T. *Darlingtonia Californica*. Meehan's Month. **5**: 1, 2. *pl. 1*. Ja. 1895.

Meyer, R. Die interessanten Arten der Gattung *Echinopsis*. Monatssch. Kakteenk. **4**: 184–186. *figs*. 20 D. 1894.

Müller, J. *Arthroniae* et *Arthothelii* species Wrightii in Insula Cuba lectae. Bull. Herb. Boiss. **2**: 725–736. D. 1894.
Descriptions of several species in both genera, with critical notes on others.

Mohr, C. Die Wälder der Alluvial Region des Mississippi in den Staaten Louisiana, Mississippi und Arkansas. Pharm. Rund. **13**: 14, 15. Ja. 1895.

Taxodium distichum is the species under consideration.

Palmer, T. C. *Isoetes saccharata.* Bot. Gaz. **20**: 32. 18 Ja. 1895.

Ramirez, J. La *Mocinna heterophylla.* Ann. Inst. Med. Nacional, **1**: 205–211. *pl. 2–5.* Au. 1894.

The author is trying to prove that the genus *Mocinna* will stand next to *Carica* and *Jacaratia* of the Passifloraceae and *Vascoucellia* DC.

Rich, W. P. Herbert A. Young. Bull. Torr. Bot. Club, **22**: 51. 15 Ja. 1895.

Notes the death of this botanist.

Rodway, J. Nature's Triumph. Pop. Sci. Month. **46**: 456–465. F. 1895.

Describes the reversion of neglected plantations to a state of nature.

Rothrock, J. T. River Birch. Forest Leaves, **4**: 185. D. 1894.

With two illustrations of *Betula nigra* in Pennsylvania.

Sargent, C. S. *Quercus Texana.* Gard. & For. **7**: 514–516. *f. 81, 82.* 19 D. 1894.

Sargent, C. S., Editor. A monstrous form of the Black Spruce. Gard. & For. **8**: 44. *f. 7.* 30 Ja. 1895.

Illustration of *Picea Mariana.*

Selby, A. D. The Russian Thistle in Ohio. Journ. Columbus Hort. Soc. **9**: 127–132. *pl. 6, 7.* S. 1894.

Small, J. K. Studies in the Botany of the Southeastern United States.—III. Bull. Torr. Bot. Club, **22**: 43–48. 15 Ja. 1895.

Describes *Juncus Georgianus* Coville, *Rumex spiralis, Monniera crenulata* and *Coreopsis longifolia* as new species.

Smith, J. D. Undescribed Plants from Guatemala and other Central American Republics.—XIV. Bot. Gaz. **21**: 1–11. *pl. 1–3.* 18 Ja. 1895.

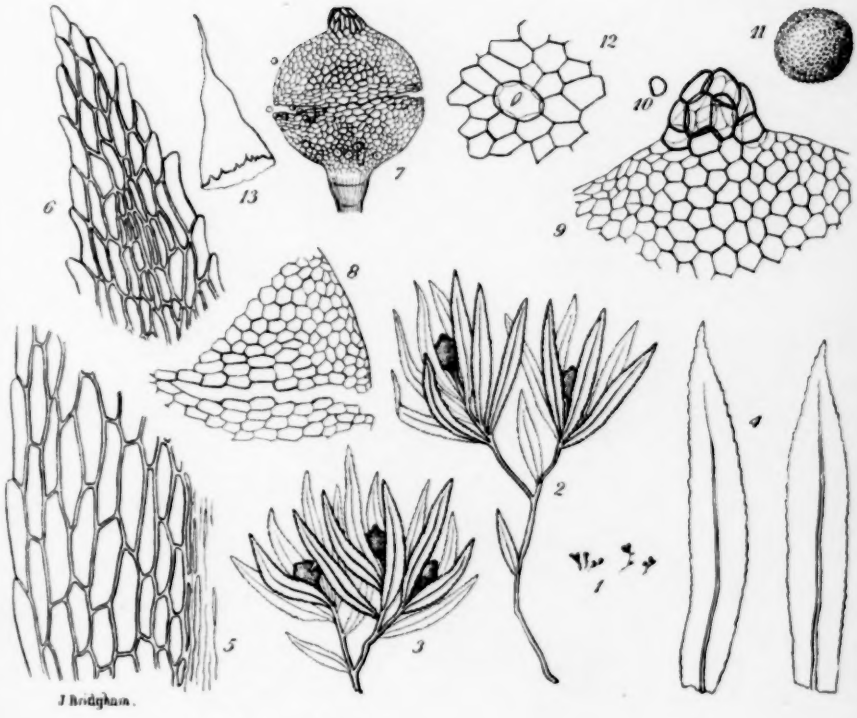
Describes 13 new species with plates of *Capparis Heydeana, Cavendishia callista* and *Chaunostoma mecistandrum,* the latter a new genus (Labiatae).

Vail, A. M. A Revision of the North American Species of the Genus *Cracca.* Bull. Torr. Bot. Club, **22**: 25–36. 15 Ja. 1895.

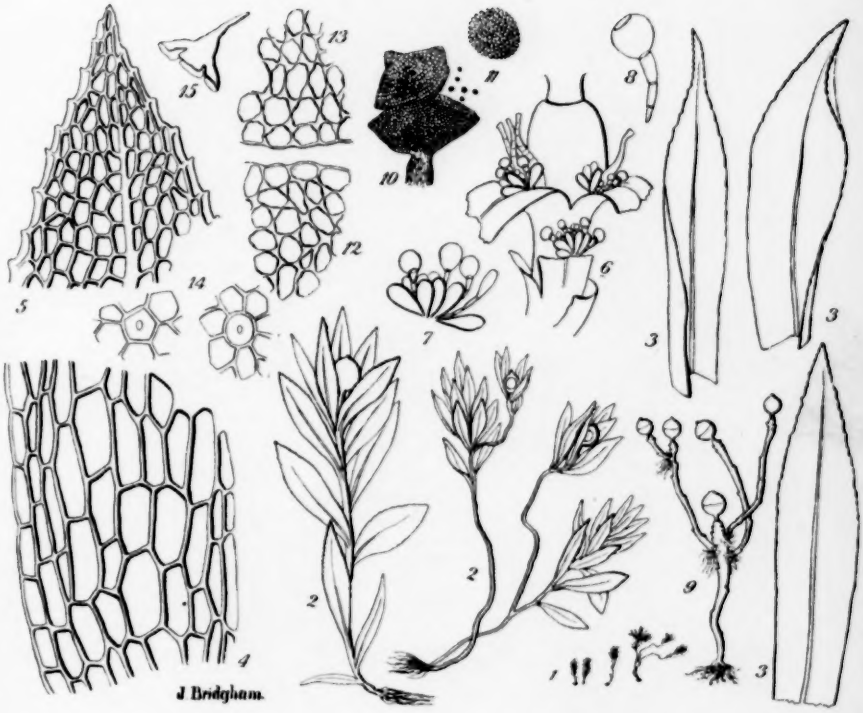
Description and synopsis of 14 species; *C. Floridana* new.

Warnstorf, C. Characteristik und Ubersicht der nord–, mittel–, und südamerikanischen Torfmoose nach dem heutigen Standpunkte der Sphagnologie. Hedwigia, **33**: 307–337. 20 D. 1894.

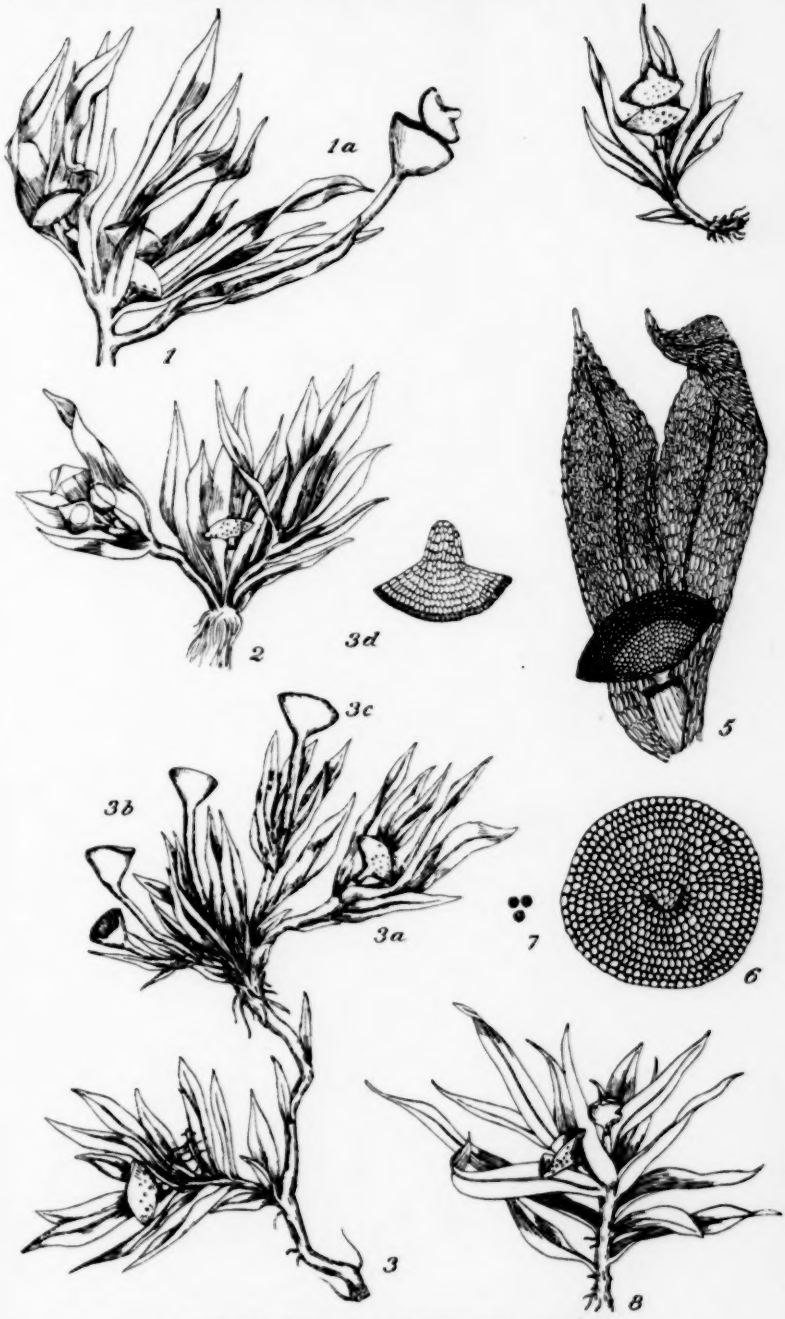
Synopsis and brief diagnoses of 85 species of *Sphagnum.*



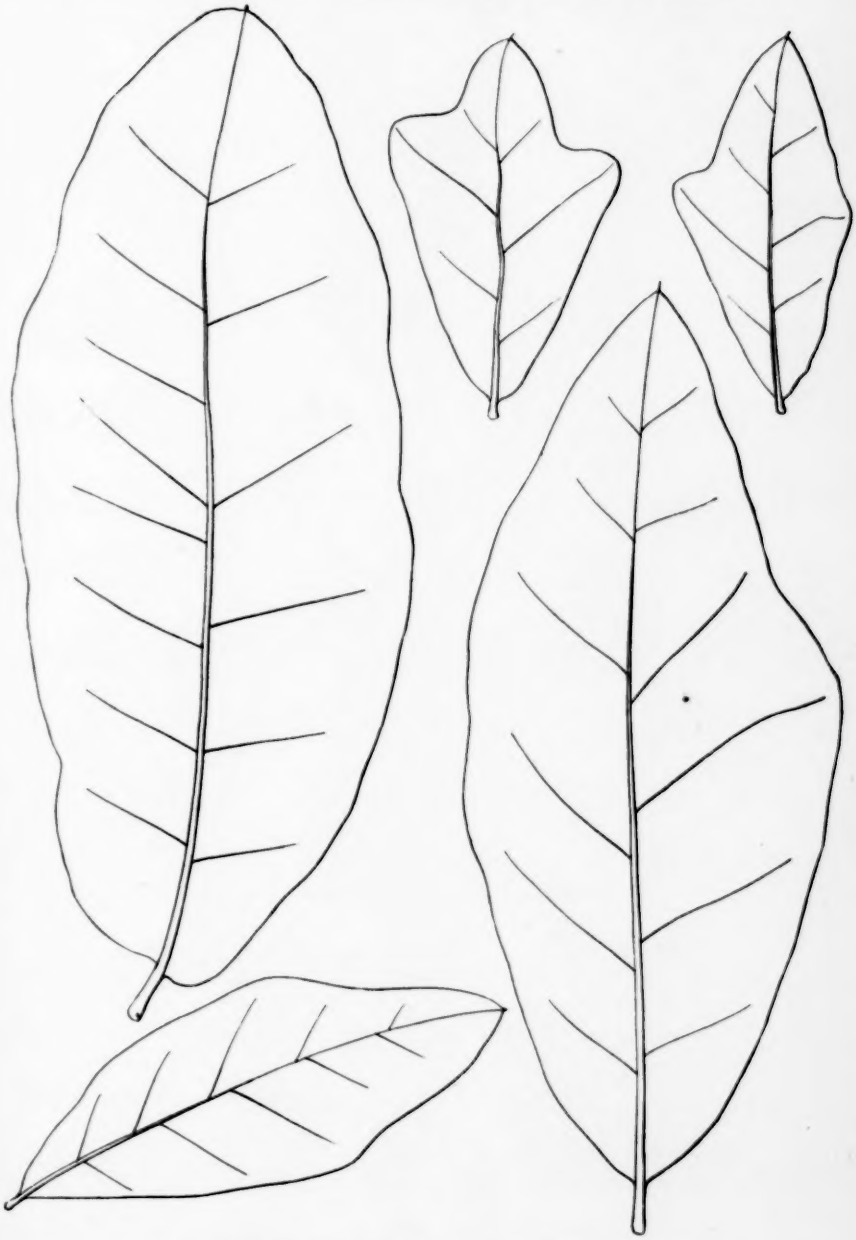
PHYSCOMITRELLA PATENS (HEDW.) BR. & SCH.



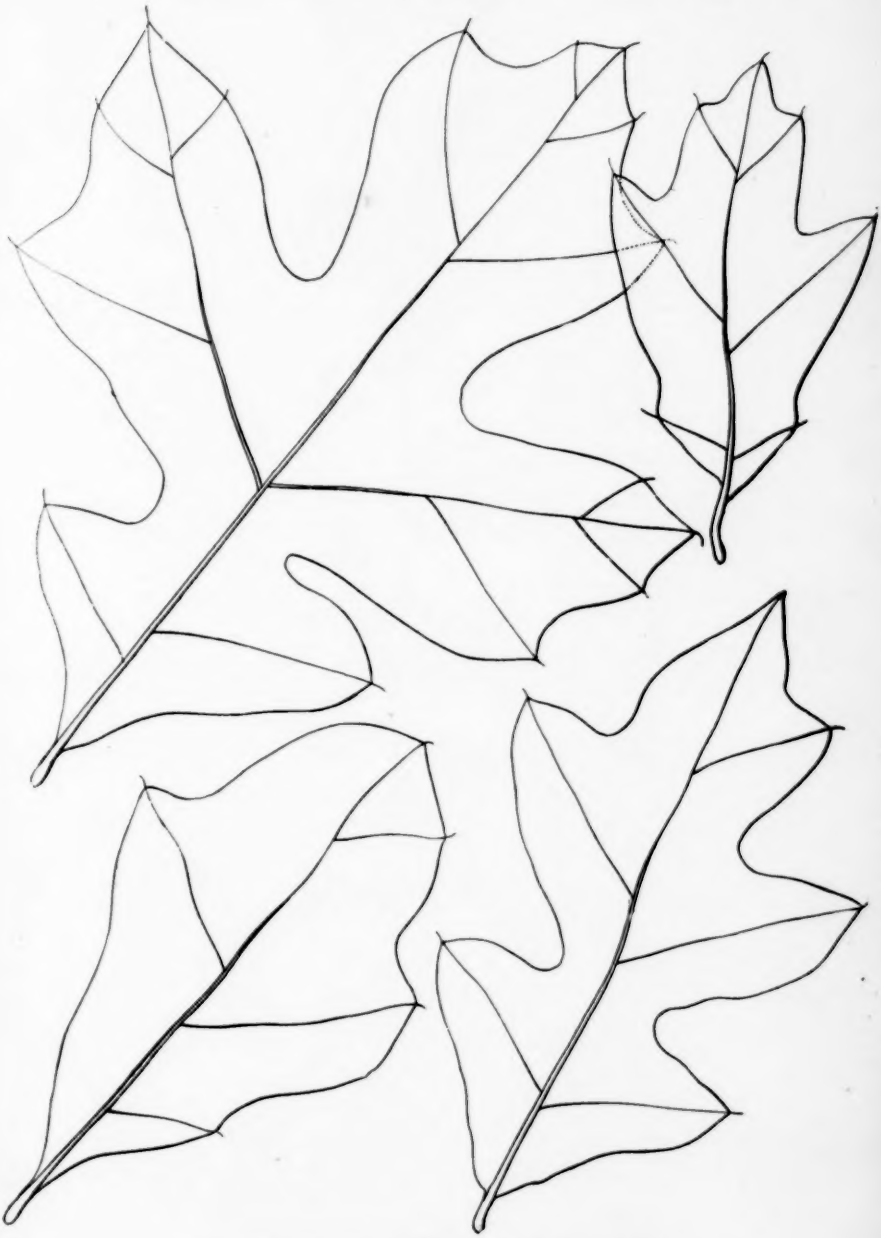
APHANORHEGMA SERRATA SULLIV.



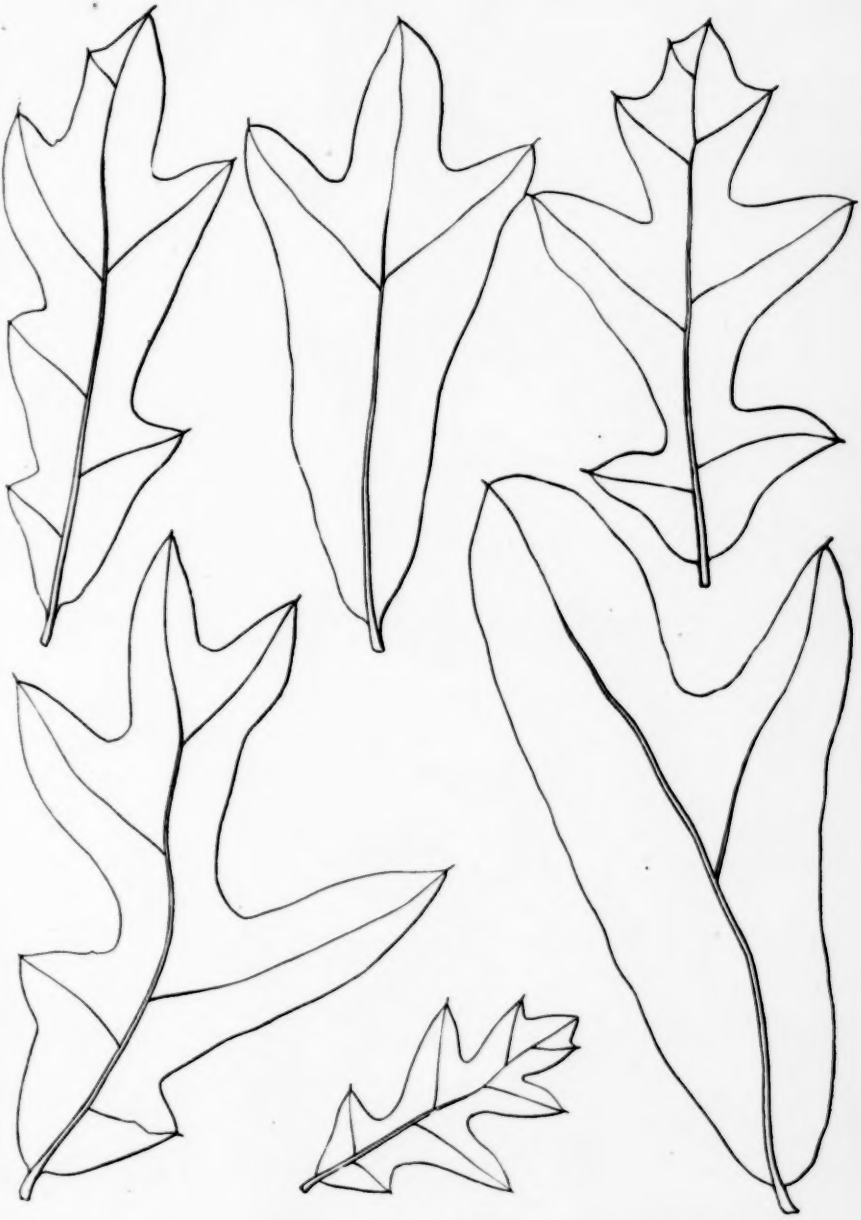
A HYBRID OF APHANORHEGMA SERRATA.



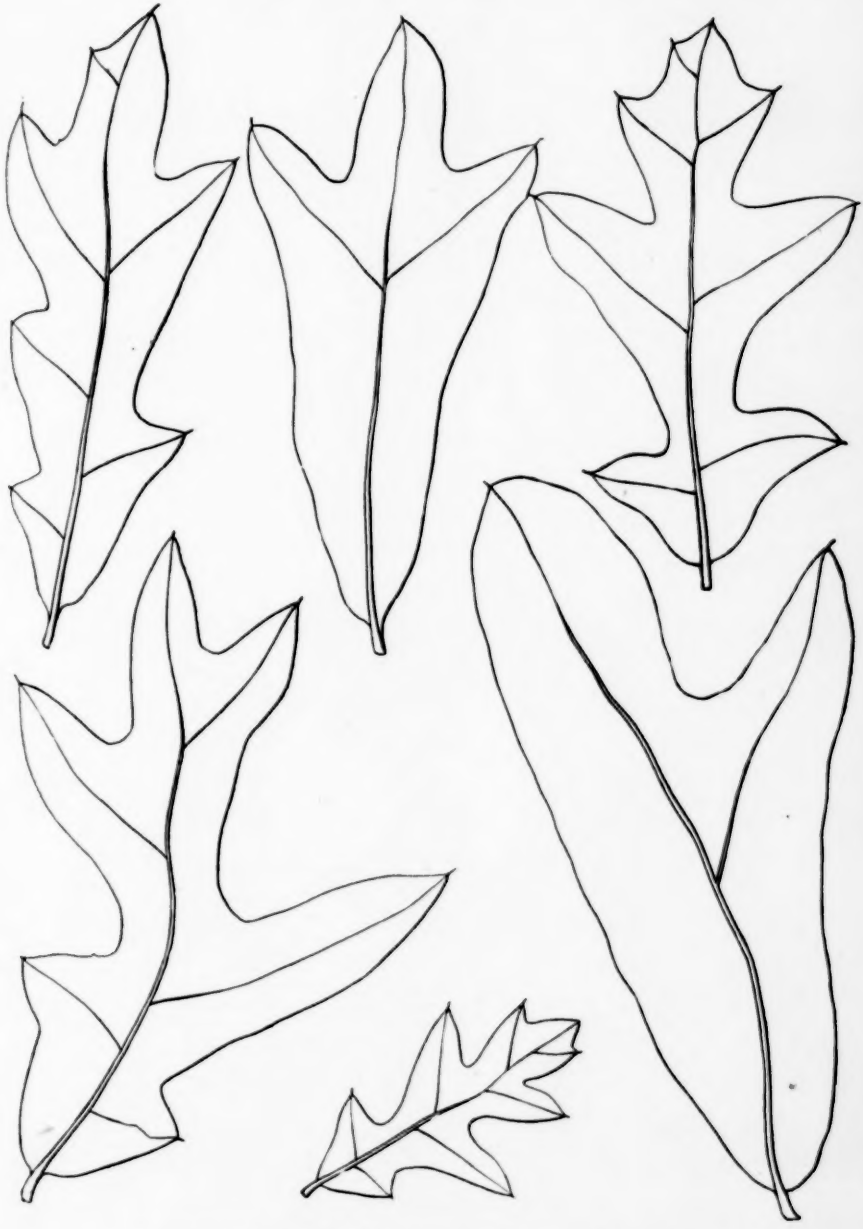
QUERCUS PHELLOS × QUERCUS DIGITATA.



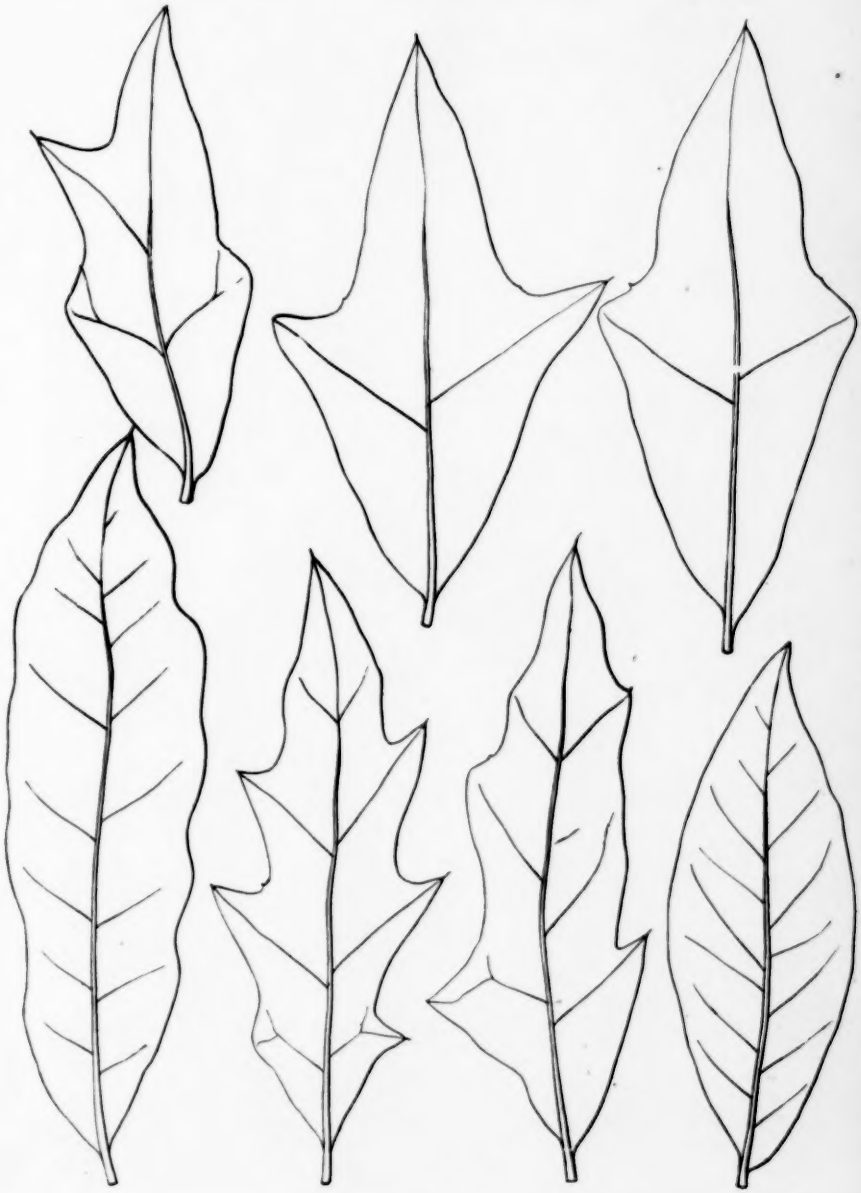
QUERCUS GEORGIANA × QUERCUS NIGRA.



QUERCUS CATESBAEI × QUERCUS CINEREA.—FORM A.



QUERCUS CATESBAEI × QUERCUS CINEREA.—Form A.



QUERCUS CATESBAEI × QUERCUS CINEREA.—Form B.

Contributions from the Herbarium of Columbia College.

[The numbers omitted from this list are out of print.]

No. 4. A List of Plants Collected by Miss Mary B. Croft at San Diego, Texas. By N. L. Britton and H. H. Rusby (1887), ... 25 cents.

No. 5. New or Noteworthy North American Phanerogams. By N. L. Britton (1888), ... 25 cents.

No. 6. An Enumeration of the Plants Collected by Dr. H. H. Rusby in South America, 1886–1887. By N. L. Britton. (Twenty-three parts published; not yet completed.)

No. 7. The Genus *Hicoria* of Rafinesque. By N. L. Britton (1888), . . 25 cents.

No. 9. A List of Plants Collected by Dr. E. A. Mearns at Fort Verde and in the Mogollon and San Francisco Mountains, Arizona, 1884–1888. By N. L. Britton.

The General Floral Characters of the San Francisco and Mogollon Mountains and the Adjacent Region. By H. H. Rusby (1888), ... 25 cents.

No. 11. Preliminary Notes on the North American Species of the Genus *Tissa*, Adans. By N. L. Britton (1889), ... 25 cents.

No. 13. New or Noteworthy North American Phanerogams, II. By N. L. Britton (1889), ... 25 cents.

No. 14. A List of State and Local Floras of the United States and British America, By N. L. Britton (1890), ... $1.

No. 15. A Descriptive List of Species of the Genus *Heuchera*. By Wm. E. Wheelock (1890), ... 25 cents.

No. 16. New or Noteworthy North American Phanerogams, III. By N. L. Britton (1890), ... 25 cents.

No. 17. The Flora of the Desert of Atacama. By Thos. Morong (1891), . 25 cents.

No. 20. New or Noteworthy North American Phanerogams, IV. By N. L. Britton. (1891), ... 25 cents.

No. 21. Notes on the North American Species of Eriocauleæ. By Thos. Morong (1891), ... 25 cents.

No. 22. New or Noteworthy North American Phanerogams, V. By N. L. Britton (1891), ... 25 cents.

No. 24. Review of the North American Species of the Genus *Xyris*. By Heinrich Ries (1892), ... 25 cents.

No. 25. A Preliminary List of the Species of the Genus *Meibomia* occurring in the United States and British America. By Anna M. Vail (1892), . 25 cents.

No. 26. A List of Species of the Genera *Scirpus* and *Rynchospora* occurring in North America. By N. L. Britton (1892), ... 25 cents.

No. 27. Note on a Collection of Tertiary Fossil Plants from Potosi, Bolivia. By N. L. Britton (1892), ... 25 cents.

No. 28. The Anatomy of the Stem of *Wistaria Sinensis*. By Carlton C. Curtiss (1892), ... 25 cents.

No. 29. New or Noteworthy North American Phanerogams, VI. By N. L. Britton (1892), ... 25 cents.

No. 30. *Ranunculus repens* and its Eastern North American Allies. By N. L. Britton (1892), ... 25 cents.

No. 31. A Preliminary List of American Species of *Polygonum*. By John K. Small (1892), ... 25 cents.

No. 33. A New Species of *Listera*, with Notes on Other Orchids. By Thos. Morong (1893), ... 25 cents.

No. 34. The North American Species of *Lespedeza*. By N. L. Britton (1893). 25 cents.

No. 35. An Enumeration of the Plants Collected by Dr. Thos. Morong in Paraguay, 1888–1890. By Thomas Morong and N. L. Britton, with the assistance of Miss Anna Murray Vail (1892–1893), ... $1.50

No. 36. An Examination of the Seeds of some Native Orchids. By Carlton C. Curtis (1893), ... 25 cents.

No. 37. Further Notes on American Species of *Polygonum*. By John K. Small (1893), ... 25 cents.

No. 38. New or Noteworthy North American Phanerogams, VII. By N. L. Britton (1893), ... 25 cents.

No. 39. Contributions to American Bryology, III.—Notes on the North American Species of *Orthotrichum*. By Elizabeth G. Britton, . . . **25 cents.**

No. 40. New Genera of Plants from Bolivia. By H. H. Rusby (1893), . **25 cents.**

No. 41. The Altitudinal Distribution of the Ferns of the Appalachian Mountain System. By John K. Small (1893), ... **25 cents.**

No. 42. Notes upon various Species of Iridaceæ and other Orders. By Thomas Morong (1893), ... **25 cents.**

No. 43. Notes on the Flora of Southeastern Kentucky. By T. H. Kearney, Jr. (1893), ... **25 cents.**

No. 44. Contributions to American Bryology, IV. Notes on the North American Species of *Orthotrichum*—II. By Elizabeth G. Britton (1894), . **25 cents.**

No. 45. Studies in the Botany of the Southeastern United States, I. By John K. Small (1894), ... **25 cents.**

No. 46. Plants from Virginia, new to Gray's Manual Range with Notes on other Species. By A. A. Heller (1894) . . . . . **25 cents.**

No. 47. New or Noteworthy North American Phanerogams, VIII. By N. L. Britton (1894), ... **25 cents.**

No. 48. Contributions to American Bryology, V.—Notes on the North American Species of *Weissia* (*Ulota*). By Elizabeth G. Britton (1894), **25 cents.**

No. 49. A Study of the Scale-characters of the Northeastern American Species of *Cuscuta*. By W. D. Matthew (1893), ... **25 cents.**

No. 50. A Study of the Genus *Psoralea* in America. By Anna Murray Vail (1894), ... **25 cents.**

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